

Comparison of Tubal and Uterine Findings in Hysterosalpingogram and Sonosalpingogram in Evaluation of Female Infertility in a Tertiary Care Hospital

Gedela Mounika Bhushan¹, Vanukuru Jayasree², Cheenepalli Anuradha³

¹Post Graduate, Department of Obstetrics and Gynecology, SVMC, Tirupati.

²Assistant Professor, Department of Obstetrics and Gynecology, SVMC, Tirupati

³Professor, Department of Obstetrics and Gynecology, SVMC, Tirupati

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Corresponding Author: Dr. Vanukuru Jayasree

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Abstract:

Background: The evaluation and treatment of infertility have undergone constant changes during periods. Due to the significant role that tubal and uterine factors play in female infertility, reliable and most accurate diagnostic methods are essential for proper evaluation and treatment. Hysterosalpingography (HSG) and Sonosalpingography (SSG) are two commonly used diagnostic procedures to assess tubal patency and uterine abnormalities.

Aim of study is to compare hysterosalpingogram and sonosalpingogram in the evaluation of female infertility.

Material and Methods: This was a Prospective study done for one year in Government Maternity Hospital, Tirupati, in 100 patients of age group 19-45 years attending the OPD diagnosed with infertility.

Results: In our study, 68% of infertility cases occur in 26-30-year-olds., with smaller percentages in the <20 years (25%) and 31-35 years (7%) categories. In our study 4 cases had tubal blockage in HSG and 3 cases had tubal blockage on SSG. Rest tubes are found to be patent in both studies. In our study there is one filling defect noted in HSG which accounts to 1%. We noted 3 significant uterine findings on SSG of which 2 cases are fibroids corresponding to 2.6% and one case of polyp corresponding to 1.3%.

Conclusion: Our study underscores the complexity of diagnosing and managing infertility. While HSG remains a valuable tool, the high specificity and non-invasive nature of SSG make it a promising alternative for initial assessments. The integration of non-invasive methods like SSG into routine practice holds potential for improving the comfort and safety of infertility diagnostics.

Keywords: Infertility, Hysterosalpingography, Sonosalpingography.

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Introduction

Infertility is defined as one year of regular, unprotected intercourse without conception. [1] The term subfertility can be used to describe women or couples who are not sterile but have decreased reproductive efficiency. There is overall increase in incidence of over the past few decades. The evaluation and treatment of infertility have undergone constant changes during the same period.

There is always a need for better diagnostic tests to evaluate infertility. [1] Non-sterile women and couples with decreased reproductive efficiency are called subfertile. A rise in incidence has occurred in recent decades.

Throughout this time, infertility evaluation and treatment have changed [1]. There is decrease in total fertility rate in India, due to voluntary childlessness and increased use of contraception,

however the societal acceptance of involuntary childlessness remains low. Although there is increasing awareness and couples are seeking medical care earlier, but are unable to continue treatment due to lack of affordability and insurance coverage for infertility treatments. Among infertility causes in India, polycystic ovary syndrome (PCOS) ranks highest, followed by tubal issues.

Because tuberculosis is so common in India, tubal factor infertility is more common there as well. Infertility is most commonly caused by peritoneal and tubal disorders; 25-35% of infertility in females is attributable to tubal pathology. Due to the significant role that tubal and uterine factors play in female infertility, reliable and most accurate diagnostic methods are essential for proper evaluation and treatment.

Hysterosalpingography (HSG) and Sonosalpingography (SSG) are two commonly used diagnostic procedures to assess tubal patency and uterine abnormalities. In this tertiary care hospital study, HSG and SSG are compared for tubal and uterine variables in female infertility. By understanding the diagnostic accuracy and clinical utility of these methods, healthcare providers can improve the management and treatment outcomes for women with infertility.

Aim of study is to compare hysterosalpingogram and sonosalpingogram in the evaluation of female infertility. Objectives of study: To identify the incidence of different types of infertility, the incidence in different age groups, to identify uterine findings, tubal findings, and peritoneal spillage on hysterosalpingogram.

Material and Methods

This was a Prospective study done for one year in Government Maternity Hospital, Tirupati, in 100

patients diagnosed with infertility of age group 19-45 years attending the OPD.

Methodology

After taking informed consent, demographic details, occupational history, medical and surgical history of the couple was obtained. Detailed obstetric, menstrual, medical, surgical, sexual history of each woman was taken. General, systemic, abdominal, and local examination was done, and a date of the HSG/SSG procedure is assigned. Routine blood investigations and Special investigations like Thyroid profile and baseline USG abdomen and pelvis were done. In the study group subjects, under aseptic precautions, Hysterosalpingography was done on day 8 to day 11 of one cycle and Sonosalpingography was done on day 8 to day 11 of the next cycle.

Results

Table 1: Distribution of Parameters

	No of Cases	Percentage
Age		
19-25years	25	25.0
26-30years	68	68.0
>30years	7	7.0
Fertility Distribution		
Primary	81	81.0
Secondary	19	19.0
Duration of Infertility		
Upto 3 years	25	25.0
3 –5 years	72	72.0
>5 years	3	3.0

Table 2: HSG and SSG Findings

	No of Cases	Percentage	
Hysterosalpingography	Tubal Findings		
	Bilateral patent tubes	96	96%
	Bilateral tubal block	1	1%
	Block of tubal at right	2	2%
	Block of tubal at left	1	1%
	Uterine Findings		
	Normal Uterus	98	98%
Filling defects in Uterus	2	2%	
Sonosalpingogram	Tubal Findings		
	Fluid in POD	84	96.5%
	No Fluid in POD	3	3.5%
	Uterine Findings		
	Normal	84	96.1%
	Sub Mucosal Fibroid	2	2.6%
Polyp	1	1.3%	

Table 3: Statistical Calculations

Sonosalpingogram	Patent	Hysterosalpingogram		Total Cases
		Patent	Not Patent	
		83	1	84
	Not Patent	-	3	3
Total Cases		83	4	87
Sensitivity 83%	Specificity 75%	Accuracy 98.8%	PPV 98.8%	NPV 100%
Hysterosalpingogram		Sonoosalpingogram		Total Cases
		Normal Uterus	Abnormal Uterus	
		Normal Uterus	84	1
	Abnormal Uterus	0	2	2
Total Cases		84	3	87
Sensitivity 84%	Specificity 66.6%	Accuracy 98.8%	PPV 98.8%	NPV 100%

Discussion:

Infertility is often caused by tubal and uterine factors. Tube patentness is crucial to infertility diagnosis and treatment. This is necessary to ensure the success of artificial insemination and ovulation induction procedures that do not include patent tubes. This study compared sonosalpingogram and hysterosalpingogram (HSG) first-line outpatient procedures for female infertility evaluation to highlight their significance.

In our study, 68% of infertility cases occur in 26-30 years, with smaller percentages in the <20 years (25%) and 31-35 years (7%) categories. This distribution aligns with the typical reproductive age range when most individuals seek to conceive. Comparatively the age range of the participants in the study by Malik et al (2014)² was 21–38 years, with a mean age of 30.1 years. This shows a little wider range but a comparable late 20s and early 30s bias. Yeshita Pujar et al [3] found that 63% of women were 25–34 years old. In a study by E. W. Nnah et al the majority of women, 52.5% to be exact, fall within the 31–35 age. All the studies highlight the importance of targeting fertility treatments and support towards individuals in this age group. [4] In a study by Kulkarni NN et al shows age wise distribution of patient in which youngest one was 23 yrs and oldest was 39 yrs old with mean age of 32 yrs. [5] The age range of the participants between 26 to 30 or 30%, and 31 to 35 yrs or 56% and greater than 36 yrs contributes to 12%.

In our study primary infertility incidence is 81% and secondary infertility corresponds to 19%. In a study by Malik et al (2014) reported similar results, with 73.3% of their study participants having primary infertility and 26.7% having secondary infertility. [2]

In a study by Kulkarni NN et al in 74% of the patient reason for performing diagnostic test for tubal patency was primary infertility and in 26 % it was secondary infertility. [5] Reddy GS et al, in this study cases of infertility were secondary (88.81%) and that of secondary infertility are

11.2%. [6] Madhok R et al primary infertility accounts to 60.4 % and secondary infertility accounts to 39.6 %. [7] This consistency suggests that first-time conception issues are a critical area of concern and require focused medical intervention. In our study, the duration of infertility showed that more than half of the cases (72%) had experienced infertility issues for upto 3 years, with 25% for 3-5years and 3% for over 6 years. Malik et al (2014) revealed a mean infertile duration of 7.7 years, ranging from 2 to 20. Both studies acknowledge the mental and physical toll of protracted infertility, while ours is shorter.

In a study by E. W. Nnah et al most study participants (97%) experienced secondary infertility, while 3% had primary. Research participant's infertility durations ranged from less than two years in 50.5% to more than two years in 49.5%. [4] The average age of the patients was 32 years, and the range of ages was 23 to 39 years, as reported by Kulkarni NN et al for primary infertility, 74% of patients underwent tubal patency testing, whereas 26% underwent secondary infertility testing. [5]

In our study 4 cases had tubal blockage in HSG and 3 cases had tubal blockage on SSG. Rest tubes are found to be patent in both studies. Malik et al [2] studied 30 patients who underwent SSG, 3 patients had unilateral tubal block, 4 patients had a diagnosis of bilateral tubal block. During HSG, only 2 of the 3 patients had a unilateral block six patients, however, had a diagnosis of bilateral tubal block. Thus, 1 patient with unilateral block and yet another with patent tubes as per SSG had a diagnosis of bilateral block on HSG, and intracavitary abnormalities were picked up in 4 of these patients on SSG and 5 patients on HSG.

Rajneesh et al (2016) investigated the efficacy of HSG and SSG in determining fallopian tube patency and correlation between the two techniques findings. Both HSG and SSG assessed 94 fallopian tubes altogether. Comparing HSG with SSG, the former found 65 patent tubes and 29 obstructed, whereas the latter showed 68 patent tubes and 26

blocked. Results from comparing SSG with HSG indicate that SSG is just as good, if not better, than HSG for determining tubal patency. The results suggest that SSG could take the place of HSG as the standard, initial screening for infertility in outpatient settings. [2]

A Study by E.W. Nnah et al the result of this study supports the view that there was a significant agreement between saline SHG and HSG in the diagnosis of uterine fibroid with a concordance rate of 94.06%. This was statistically significant. [4] In study by Greeta Mathews et al diagnosis by SSG showed bilateral tubal patency in 84% cases and by HSG showed bilateral tubal patency in 70% cases. [8] In this study positive predictive value was 95.6% and negative predictive value was 94.9%. Sensitivity was 98.5%, specificity 85.1% and accuracy rate of this study was 95.3%.

In study by Madhok Ret al, 56 tubes of primary infertile patients were evaluated by HSG and SSG. One tube that showed blockage on HSG was interpreted as patent on SSG. 38 tubes of secondary infertile patients were evaluated by HSG and SSG. 2 of the tubes that were interpreted as blocked on HSG were interpreted as patent on SSG. Total 65 tubes showed patency and 29 tubes showed blockage on HSG, whereas on SSG, 68 tubes were patent and 26 tubes were blocked. Therefore 65 tubes were interpreted as patent and 26 tubes were interpreted as blocked by HSG as well as SSG suggesting good agreement between the two techniques. [7] In our study, there is one filling defect noted in HSG which accounts to 1%. We noted 3 significant uterine findings on SSG of which 2 cases are fibroids corresponding to 2.6% and one case of polyp corresponding to 1.3%. In a study by Kumari R et al SSG showed the following pelvic pathology, Hydrosalpinx which accounts to 4.3%, Genital tuberculosis which accounts to 1.3%, Ovarian cyst which accounts to 3.0%, tubo ovarian lump which accounts to 4.2%, Endometriosis which accounts to 3.0%, uterine fibroid which accounts to 4.0%. [9]

In a study Kulkarni NN et al, out of 50 patients Hydrosalpinx accounts to 3 cases, Tuboovarian lump Accounts to 3 cases, endometriosis accounts to 2 cases and 2 cases of fibroid uterus and 1 case of fibroid polyp noted. [5] In this study, there was also a high concordance rate of 96.04% between saline SHG and HSG in the diagnosis of intrauterine adhesions. Though the sensitivity of saline SHG in this study in the diagnosis of intrauterine adhesion was low at 62.5%. Study by Goldberg, Jeffrey M, et al this study showed a concordance rate of 96.04% between saline SHG and HSG in the diagnosis of tubal patency. [10]

In our study HSG shows 4 % tubal blockage and 96% showed tubal patency. In contrast, SSG

indicated that 96.5% of cases had patent tubes, and 3.5 % had tubal blockages. In our study we noted 3 significant uterine findings on SSG of which 2 cases are fibroids corresponding to 2.6% and one case of polyp corresponding to 1.3%. The sensitivity of the HSG is approximately 100%, and specificity of the HSG is 66.6%, the sensitivity of the SSG is 100%, and the specificity is 75%. In a study by Madhok R et al [9] approximately 94 tubes were assessed. Results were inconsistent in 3 of 94 tubes. These patients had laparoscopic chromopertubation to confirm SSG. The SSG-HSG deal was great, and the results of the two processes were correlated with each other (Kappa=0.923). The standard error was 0.437. Acholonu UC et al reported that HSG detected abnormalities with a sensitivity of 58.2% and a specificity of 25.6%, highlighting its moderate effectiveness in detecting abnormalities compared to hysteroscopy. [11] This discrepancy emphasizes the need for comprehensive diagnostic approaches, as supported by Acholonu UC et al. and Malik et al, who noted higher sensitivity and specificity for SSG and saline infusion sonohysterography (SIS) compared to HSG.

A Study by Malik et al, SSG and laparoscopy showed a correlation of 97% and 93%, respectively. As part of the first evaluation for infertility, transvaginal SSG was determined to be a noninvasive, cost-effective method of determining tubal patency. The diagnostic accuracy of sonohysterography was comparable to that of hysteroscopy, although the sensitivity and PPV of HSG were 50% and 28.6%, respectively, and of TVS they were 75%. HSG had a sensitivity of 77.8% for uterine anomalies, a sensitivity of 75% for TVS and HSG intrauterine adhesion, and a PPV of 42.9% and 50%, respectively.

In a study by Greeta Mathews et al bilateral tubal patency was detected in 84% of patients by SSG and 70% by HSG. SSG and HSG correlated (95.3%) and showed equal diagnostic accuracy. With a PPV of 95.6%, NPV of 94.9%, Sensitivity of 98.5%, and Specificity of 85.1%, SSG outperforms HSG. [8]

Study by Yeshita Pujar, et.al [3] in our study saline infusion sonohysterography had a high diagnostic accuracy (sensitivity of 97.8%, specificity of 88.8%, PPV of 97.8% and NPV of 88.8%) for detection of uterine cavity abnormalities. The diagnostic accuracy of SIS for tubal patency (sensitivity of 83.3%, specificity of 82.9%, PPV of 42.9% and NPV of 97.5%) was less when compared with the diagnostic accuracy of SIS for detection of uterine cavity abnormalities. The accuracy of diagnosis of unilateral tubal patency (97.5%) by SIS was higher than for diagnosis of bilateral block (50%). In this study 73.3% of women did not experience pain at all, 18.3% had

mild pain and only 1.7% of women had moderate pain. The reduced incidence of pain was mainly due to the use of fine IUI catheter.

Conclusion

Our study underscores the complexity of diagnosing and managing infertility. While HSG remains a valuable tool, the high specificity and non-invasive nature of SSG make it a promising alternative for initial assessments. The integration of SSG into routine practice holds potential for improving the comfort and safety of infertility diagnostics. Addressing the menstrual irregularities and considering discrepancies between HSG and SSG, combined diagnostic approaches can enhance accuracy and patient outcomes. Further larger population studies and longitudinal examinations are needed to confirm these findings and improve infertility detection procedures.

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